



## **Convective transport of electric charge within the planetary boundary layer**

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Turbulent and convective processes within the planetary boundary layer are responsible for the transport of moisture, momentum and particulate matter, but are also of major importance in determining the electrical charge structure of the lower atmosphere. This paper presents rare experimental measurements of vertical profiles of charge measured during fair weather conditions by specially instrumented radiosonde balloons over Alqueva, Portugal during the summer of 2014. Space charge was measured directly using a sensitive electrometer, rather than the conventional method of deriving it from electric field measurements. The high frequency of balloon flights enabled the diurnal variation in the vertical profile of charge within the boundary layer to be examined in detail, with much smaller levels of charge (up to 20pC m<sup>-3</sup>) observed during stable night time periods than during the day. Following sunrise, the evolution of the charge profile was much more complex, showing a dependence on lofting of surface aerosol due to daytime convection. This produced charge up to 92pC m<sup>-3</sup> up to 500m above the surface. The diurnal variation in the integrated column of charge above the measurement site was also found to track closely with the diurnal variation in near surface charge as measured by an electric field mill at the same site, confirming the importance of the link between surface charge generation processes and aloft. Co-located lidar backscatter measurements were also made during the measurement campaign and will be discussed here in the context of the effect of aerosol on the vertical charge profile.